order in its appearance and progress; that the pencils of rays or streamers, as they are called, generally make their first appearance in the north; and as they rise from the horizon, assume the form of an arch, extending from east to west, and having its vertex in the plane of the magnetic meridian, the arch itself being at right angles to that plane. While the arch itself is near the horizon, its breadth from north to south is considerable; and the streamers of which it is composed appear to be nearly at right angles to the general line of the arch, their directions converging to a point a few degrees to the south of the zenith. As the arch moves forwards towards the south, its lateral dimensions appear to contract, the intensity of its light increases, and the directions of the streamers, still tending to the same point in the heavens, approach more nearly to parallelism with that of the arch. When it has passed the zenith, and arrived at the above-mentioned point, a little to the south of the zenith, the arch is seen as a narrow belt, 3° or 4° only in breadth, and with well-defined edges. In its further progress southwards, it again enlarges in breadth, and exhibits, in a reverse order, the same succession of changes as before. Hence, the author concludes that the streamers have individually a position nearly vertical or parallel to the magnetic dip; that they form a thin fringe, stretching often to a great distance from east to west, at right angles to the magnetic meridian; and that the movement of the fringe from north to south takes place by the extinction of streamers at its northern side, and the formation of new ones contiguous to its southern side.

From a variety of observations which are detailed in this paper, the author infers, in opposition to the opinion of Mr. Dalton, that the region occupied by this meteor is above, but contiguous to, that of the clouds, or at least to that in which aqueous vapour is condensed, so as afterwards to appear in the form of clouds. The height of this region he estimates as in general about 2000 feet above the surface; and he is of opinion, that while such is the height of the lower ends of the vertical streamers, their upper ends may have an elevation of 2000 or 3000 feet more.

*Observations on the Functions of the Intestinal Canal and Liver of the human Fœtus.* *By* Robert Lee, *M.D., Physician to the British Lying-in-Hospital.* *Communicated by Dr.* Prout, *F.R.S.* Read June 19, 1828. [*Phil. Trans.* 1829, *p.* 121.]

From the circumstances of the early development of the liver and intestines in the fœtus, of the copious supply of blood which they receive, and of the great space which they occupy in the abdomen, the author was led to the conclusion that they performed some important functions in the fœtal economy. Although no nutritive matter can be furnished by the mouth, yet the contents of different portions of the alimentary canal were found, both in appearance and chemical composition, to bear a striking analogy to those of the same portions of the canal in the adult, where the processes of assimilation and ab-

sorption are performed. A semi-fluid matter, possessing all the characters of albumen, is found closely adhering to the inner coats of the small intestine; and is more especially abundant around the papillary projection, through which the common duct of the liver opens into the duodenum, and diminishes in quantity as we trace it towards the termination of the ileum. The great intestines are generally distended with a dark green homogeneous fluid, containing no albumen, and apparently excrementitious. No albumen can be detected in the contents of the stomach. Hence the author infers that an absorption of some nutritious substance, which he brings forward several arguments to show must be derived from the liver, takes place from the intestinal canal in the latter months of gestation. He states that in two instances he detected the presence of a substance, similar to that which he had found in the duodenum, in the hepatic duct itself; hence he is led to the conclusion that the function of the liver in the fœtus is not confined to the separation of excrementitious matter from the blood, but that it supplies materials subservient to nutrition. That the substances existing in the intestines of the fœtus are not derived from the mouth, is proved by their being equally found in acephalous children, or where the œsophagus is impervious, as where no such mal-conformation exists.

A note is subjoined to this paper by Dr. Prout, giving an account of the mode by which he ascertained the chemical character of the substance referred to his examination; and the paper is accompanied by drawings of the intestinal tube in the fœtus.

*Experiments on the Modulus of Torsion.* *By* Benjamin Bevan, *Esq.* *Communicated by the President.* Read December 18, 1828. [*Phil. Trans.* 1829, *p.* 127.]

The object of the author in this paper is to ascertain the modulus of torsion in different species of wood, and also of metals, deduced from experiments on a large scale, which he conceives will furnish many useful data, applicable to practice by the mechanic and engineer. Care was taken that the specimens of wood which were the subjects of experiment were sound and dry, and free from any large knots; and their correct dimensions were ascertained by an improved kind of callipers.

To every specimen two indexes were attached; one, a few inches from the end, fixed in the clamp or vice, and the other, at a small distance from the attachment of the lever, to which the straining power was applied; and the length of the bar subjected to torsion was estimated by the distance of the points of attachment of the indexes. A pivot was fixed at the supported end of the bar, in lieu of its axis.

The author gives the following rule for finding the deflection of a prismatic shaft; namely, that it is equal to the product of the straining power into the square of the radius by which it acts, and into the length of the shaft, divided by the modulus of torsion into the fourth power of the side of the square shaft. He then gives a table of the